STATEMENT

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BEFORE THE

SUBCOMMITTEE ON PREVENTION OF NUCLEAR AND BIOLOGICAL ATTACK

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Statement of The Honorable John H. Marburger, III
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Introduction

Good morning, Mr. Chairman and Members of the Subcommittee. It is a pleasure to be here today before the Subcommittee on Prevention of Nuclear and Biological Attack. Your hearing focuses on an issue of critical importance – the science behind prevention efforts, and the research and development efforts underway to develop countermeasures to nuclear and biological attacks. Making full use of the nation's collective S&T expertise is critical for long-term success in this endeavor, and in the overall war on terrorism.

The possibility of an attack with nuclear or biological weapons has long been seen by this Administration as one of the greatest threats to U.S. national security. Unlike other weapons, nuclear and biological weapons have the potential to inflict catastrophic damage in terms of both the number of casualties and the destruction of public infrastructure. The President released *The National Strategy to Combat Weapons of Mass Destruction* in December of 2002 to lay the groundwork necessary to counter the threat from nuclear and biological weapons. This strategy called for a coordinated national effort to prevent, prepare, and respond to this threat, and highlights the critical importance of science and technology in this endeavor.

The information and recommendations contained in the 2002 National Academy of Sciences (NAS) report "Making the Nation Safer: The Role of Science and Technology (S&T) in Countering Terrorism" were taken into consideration in the development of the national S&T response to this threat. This report highlighted a number of areas where science and technology could be applied to reduce the threat from biological and nuclear weapons, including:

- improved special nuclear material detection capabilities;
- improved communication between the intelligence S&T and public health communities;
- development of early warning and detection technologies for biological agents;
- improved models to better understand the potential impact of biological weapons;
- increased research, development and production of new medical countermeasures;
- improved personnel protective equipment; the development of methodologies;
- guidelines for the decontamination of radiological material or biological agents.

Finally, there have been a number of Homeland Security Presidential Directives (HSPDs) issued over the past four years that have particular relevance to countering the threat from

biological and nuclear weapons. I would like to specifically address three of them, as they have played a key role in shaping our nuclear and biodefense R&D efforts: HSPD-9, NSPD-33/HSPD-10 and HSPD-14.

Signed on January 30th, 2004, HSPD-9 Defense of United States Agriculture and Food establishes a national policy to defend the agriculture and food system against terrorist attacks, major disasters, and other emergencies. This directive lays out the steps necessary to prepare our nation for such events and highlights many roles for research and development, including a role for my office in the acceleration and expansion of countermeasure development.

Released on the 28th of April, 2004, NSPD-33/HSPD-10. *Biodefense for the 21st Century*, defines the nation's biodefense strategy. This directive was the culmination of a comprehensive end-to-end assessment led by the Homeland Security Council (HSC) of biodefense needs and capabilities across all agencies, and laid out specific agency responsibilities to support four main pillars:

- **Threat awareness,**
  - Improve the Intelligence Community's ability to collect, analyze, and disseminate intelligence on biological weapons and their potential users.
  - Anticipate and prepare for novel or genetically engineered biological threat agents.
- **Prevention and protection,**
  - Improve our ability to detect, interdict and seize weapons technologies and materials to disrupt the proliferation trade, and to pursue proliferators through strengthened law enforcement cooperation, including Interpol.
  - Enhance diplomacy, arms control, and bilateral and multilateral efforts that impede adversaries who seek biological weapons.
  - Assess the vulnerabilities of our critical infrastructure to focus protective efforts.
- **Surveillance and detection, and**
  - Develop and integrated early warning system to rapidly recognize and characterize any biological attack, permitting an early and robust response to prevent illness and deaths, as well as economic and social disruption.
  - Enhance our ability to attribute biological weapons attacks, thereby strengthening deterrence of attack.
- **Response and recovery**
  - Create and refine comprehensive plans to mitigate the lethal, medical, psychological and economic consequences of an attack.
  - Provide the newest and most effective medical countermeasures such as vaccines, drugs and diagnostics to prevent illness and save lives.
  - Coordinate federal assets to assist state and local public health and medical response to mass casualty events caused by WMD.
  - Develop risk communications strategies, plans and products to reach all segments of domestic and international communities.
  - Improve capabilities to remediate and decontaminate the environment following a biological attack.

HSPD-14, released on April 15th of 2005, established the Domestic Nuclear Detection Office (DNDO) within the Department of Homeland Security. The DNDO was established to provide the U.S. with a multilayered and well coordinated nuclear detection architecture, and to serve as the lead federal agency for the research and development pertaining to nuclear and radiological detection capabilities. As Mr. Oxford is present today I will let him describe in detail the essential role of, and the significant advances made by, the DNDO in securing our nation from nuclear terrorism.

These reports and directives form the foundation of the S&T community's efforts to develop and deploy technologies in support of the prevention of nuclear and biological attacks. Rather than list the accomplishments of the last four years, I would like to take this opportunity to look forward by defining our current homeland security-related S&T priorities, and the role S&T must continue to play as part of a comprehensive strategy to combat terrorism and WMD.

The Role of OSTP in the Coordination of S&T related to Homeland Security

Let me first take a brief moment to provide an overview of The Office of Science and Technology Policy, and its role in Homeland Security S&T.

The Office of Science and Technology Policy, which I lead, has the primary responsibility within the Executive Office of the President to prioritize and recommend federal R&D activities, and to coordinate those activities at the interagency level.

S&T related to homeland security is particularly unique in its need for coordination as it impacts mission areas, and requires the diverse skill sets and expertise, of multiple departments and agencies. In 2006, nine different departments and agencies received funding for homeland security-related research and development projects.

The primary mechanism for coordination of interagency science and technology issues is the National Science and Technology Council (NSTC), which was established by Executive Order 12881. This Cabinet-level Council, chaired by the President, is the principal means for coordinating science and technology issues across the executive branch. One of the NSTC's four standing committees, the Committee on Homeland and National Security is focused on identifying S&T priorities and facilitating the planning among federal departments and agencies involved in homeland and national security S&T. The work of the Committee on Homeland and National Security is closely coordinated with the efforts of the Homeland Security Council and the National Security Council.

R&D Priorities to Counter the Threat of WMD as Stated in the OSTP/OMB Budget Priorities Memo for FY 2008.

From 2004 to 2006, homeland security-related R&D funding has totaled $11.5 billion dollars with an additional $4.8 billion requested for FY2007. The majority of this

funding is directed at enhancing our capabilities to prevent, detect, protect from, or respond to, an attack with WMD. Of the $11.5 billion dollars of homeland security-related R&D funding from 2004 to 2006, $8.2 billion dollars was devoted towards countering the threat from WMD. Of the $4.84 billion requested for homeland security-related R&D funding in the President's FY2007 budget, $3.76 billion is targeted at countering the threat from WMD.

The work being done to counter the threat from WMD, especially the threat from biological and nuclear agents, requires the expertise and capabilities of multiple Departments and Agencies and is not solely the realm of DHS S&T. The Departments and agencies most heavily involved in this research are DHS, DoD, HHS, DoE, and USDA. Basic research at NSF also contributes greatly to this effort.

On June 23rd of this year, OSTP released, in coordination with the Office of Management and Budget, a memorandum for the heads of executive departments and agencies on Administration Research and Development (R&D) Budget Priorities for FY 2008. This memo highlights the Administration's R&D priorities and emphasizes improving management and performance to maintain excellence and leadership in science and technology. It also provides general guidance for setting priorities among R&D programs, identifies interagency R&D efforts that should receive special focus in agency budget requests, and reiterates the R&D Investment Criteria that agencies should use to improve investment decisions for and management of their R&D programs. These updated R&D budget priorities reflect an extensive, continuous process of consultation with the President's Council of Advisors on Science and Technology (PCAST) and collaboration within the interagency National Science and Technology Council (NSTC). For the past four years, this memo has included a section on priorities in Homeland Security related R&D and I would like to talk about these priorities today.

Four years have passed since the publication of the President's *National Strategy for Homeland Security* which identified the Nation's S&T enterprise as a key asset in our efforts to secure the homeland. All parts of that S&T enterprise, both public and private, have answered the call for the development of "new technologies for analysis, information sharing, detection of attacks, and countering chemical, biological, radiological, and nuclear weapons." Despite the significant achievements over the past four years, many challenges remain to mitigate vulnerabilities. Every year, we seek to highlight these challenges in the priorities memo, not to exclude ongoing efforts, but to focus new initiatives and funding in the areas where they are most needed.

For FY08, we encourage agencies to place increased emphasis on Homeland Security related R&D efforts that support:

- quick and cost-effective sampling and decontamination methodologies and tools for remediation of biological and chemical incidents;
- the development of integrated predictive modeling capability for emerging and/or intentionally released infectious diseases of plants, animals and humans, as well as for chemical, radiological or nuclear incidents, and the collection of data to support these models;

• the exploitation of recent advances in biotechnology to develop novel detection systems and broad spectrum treatments to counter the threat of engineered biological weapons;
• the development of novel countermeasures against the natural or intentional introduction of agricultural threats, including R&D on new methods for detection, prevention, and characterization of high-consequence agents in the food and water supply;
• transformational capabilities for stand-off detection of special nuclear material and conventional explosives;
• biometric recognition of individuals for border security, homeland security, and law enforcement purposes in a rapid, interoperable, and privacy-protective manner; and
• recognizing and expediting safe cargo entering the country legally, while securing the borders against other entries.

I would like to take this opportunity to provide you with a brief discussion of our vision for each of the five areas contained in this memo relevant to the mission of this subcommittee.

Decontamination of Biological Agents

The small scale indoor release of anthrax in October 2001 illustrated the magnitude of the threat to public health and infrastructure that is posed by biological weapons. The attacks claimed five victims and contaminated multiple postal facilities, the American Media, Inc., building in Boca Raton, Florida, and the Hart Senate Office building. The cleanup of these buildings cost hundreds of millions of dollars and took years to complete. The Brentwood Mail Facility alone cost $130 million and took over 2 years to finish. These small attacks clearly demonstrated the gaps that exist in technologies, methods, and procedures used for the decontamination of biological agents. A deliberate attack with anthrax over a major metropolitan area has the potential to displace thousands of people and close hundreds of businesses for years. As an example of the cost associated with losing even one piece of critical infrastructure, the San Francisco Airport Authority estimated a daily economic effect of $85 million lost for each day spent undergoing decontamination and restoration. Investment in the development of new technologies and methodologies for the wide area decontamination of biological and chemical agents is needed to offset the cost of restoration after a potential terrorist attack. Furthermore, many of the technologies that need to be developed will also improve our current capabilities to clean up the contamination and environmental damage that are associated with natural disasters

Developing the technologies necessary to address the deficiencies in our current biological agent decontamination capabilities will require a mixture of both long term basic research, and short term applied and advanced development research. A focused and directed investment in the R&D of novel decontamination technologies for biological agents over the next 10 years will yield the tools needed to improve the efficiency and reduce the time and cost associated with the decontamination operations, regardless of

future target cleanup levels. Short term applied research on novel decontamination technologies over the course of the next five years could have an immediate positive impact on our decontamination capabilities. Examples of near term technological solutions include the development of: novel tenting materials for rapid site preparation for fumigation, better fumigant monitors, improved characterization of surface effects, and development and testing of non-destructive decontamination methods. A comprehensive decontamination R&D program must also include long-term basic research focused on better understanding the characteristics of biological agents as they relate to decontamination. The recent NAS report entitled "How Clean is Safe?" concluded "there is insufficient information to quantify a 'safe' amount of residual biological agent in a decontaminated facility." It also pointed out that there are many issues that decision makers need to consider when decontaminating a facility. Studies that examine environmental persistence, susceptibility to various decontaminants, and improved methodologies for sampling will be critical for any future efforts to develop realistic clean up levels for biological agents.

The National Science and Technology Council's Subcommittee on Decontamination Standards and Technologies was formed in 2005 to coordinate the efforts of all Departments and Agencies with responsibilities for, or capabilities applicable to the environmental decontamination of biological agents. The subcommittee has been working to develop risk management-based guidance for biological and chemical agent decontamination operations. This work is currently in review and should be available in the next few months. The SDST has also been working to identify the technology needs and gaps that must be overcome in order to support efficient decontamination operations, and to coordinate the R&D efforts of multiple agencies (namely DOD, DHS, and EPA) to address those gaps.

Modeling

There are pockets of world-class infectious disease modeling expertise within a small number US universities, national laboratories, and the federal government; however current efforts are limited and insufficient to produce needed national capacity. It presently is a “scientific cottage industry” supported to a limited extent by the National Science Foundation, Departments of Health and Human Services, Agriculture, Interior, Energy, Defense, and Homeland Security.

With the current threat of a highly pathogenic avian influenza pandemic and other fairly recent outbreaks of emerging or zoonotic diseases such as SARS, there has never been a greater need for the U.S. to have the capability to model the geospatial and temporal spread of infectious diseases to enhance and/or enable threat awareness, prevention and protection, surveillance and detection, and to test and identify measures for response and recovery as called for by HSPD’s 9 and 10.

Epidemiological/mathematical/statistical models can be used to develop response plans, inform policy decisions, compare and exercise effects of control measures under different scenarios, train personnel, and educate industrial groups. One highly successful model

for accomplishing this is the Models of Infectious Disease Study (MIDAS) established by the National Institutes of Health (NIH). MIDAS funds several world-class groups of investigators using epidemiological and mathematical models to address high priority infectious diseases of public health. MIDAS has already had a profound impact on the Nation's understanding of pandemic influenza, including its transmission, the effectiveness of various strategies for mitigating its spread, and the required amounts of vaccines and anti-virals. Much of the information reported through the MIDAS group has been used to inform policy decisions, and in turn surfaced additional questions, the answers which, could help inform additional policy questions.

The Department of Homeland Security is conducting a joint analysis between the National Infrastructure Simulation and Analysis Center (NISAC) and the Critical Infrastructure Protection Decision Support System (CIPDSS) team to investigate possible impacts in two specific areas in support of the National Strategy for Pandemic Influenza. The first is to analyze the potential impacts of pandemic influenza on U.S. infrastructures by evaluating which infrastructure sectors will be most impacted by a potential influenza pandemic and how the proposed policies for mitigation measures such as social distancing and vaccine and antiviral distribution would alter the impacts to infrastructures. Issues that will also be evaluated include identifying differential impacts (by asset, infrastructure, population and region), including specifically healthcare and emergency response impacts and how infrastructure impacts will influence the spread and recovery processes. The second area of focus will be an evaluation of the effects of uncertainties on response effectiveness and economic impacts from a pandemic affecting the national workforce and the national infrastructure.

In addition, the Departments of Agriculture, Interior and Homeland Security are in the process of building a collaborative effort to model the impacts of various countermeasures against foreign animal diseases such as Avian Influenza and Foot and Mouth Disease. The next step in this process would be to connect the two by bringing together the public health and animal health communities to examine the need for the coordination of modeling in each of these communities and how this might best be accomplished.

Development of Medical Countermeasures

The development and acquisition of medical countermeasures to prevent and/or treat the effects of CBRN agents is a critical component of our efforts to prepare for and mitigate the effects of an attack with WMD. In fact, the development of medical countermeasures against WMD accounts for a significant portion of all S&T funds directed against the WMD threat. The key role for development and acquisition of effective medical countermeasures against WMD previously has been identified in Homeland Security Presidential Directives 4, 9, and 10. In addition, supporting legislation, including the *Project BioShield Act of 2004*, which provides nearly $5.6 billion dollars over ten years to provide for the acquisition of new medical countermeasures against CBRN agents, highlights the importance of an integrated enterprise across the Federal government and includes stakeholders from academia and industry.

Significant progress has been made in the development of medical countermeasures against biological and nuclear agents over the past four years.

- The National Institute of Allergies and Infectious Diseases at the National Institute of Health has seen an increase in biodefense and medical countermeasures development funding from $53 million in 2001 to $1.8 billion in fiscal year 2006, (with close to $1.9 billion requested for 2007) with comparable funding in FY05, 06, and 07), and has set up an aggressive program of basic research aimed at better characterizing a select group of biological agents thought to have a high probability of being used as potential bioterror agents, as well as implementing programs to better understand the effects of chemical and radiological agents in an effort to develop new countermeasures against these threats. Much of the NIAID medical countermeasure research effort has centered on multiple Centers of Excellence based around cutting edge U.S. medical research centers in an effort to focus the research efforts of the academic community on these important issues. NIAID has also improved the U.S. biodefense infrastructure by funding the construction of 4 new high containment laboratories (BSL-3/4) in order to increase the laboratory facilities necessary for the high volume of research on high priority biothreat agents.
- DHS has completed Material Threat Assessments (MTAs) for all of the class A biological agents, as well as nerve agents and radiological threats. These intelligence based assessments play a critical role in the BioShield procurement process by providing HHS with the necessary information on which to build their requirements for medical countermeasures. As of January 2006, DHS has completed a comprehensive threat analysis of likely biothreat agents. This new threat assessment methodology will provide a powerful tool for future prioritization of WMD medical countermeasure R&D and acquisition needs.
- The Special Reserve Fund (SRF) of Project BioShield has been utilized to award four contracts for the delivery of countermeasures that address two of the four initial material threats (anthrax and radiation, small pox was addressed before Project BioShield):
    - $877.5 million for 75 million doses of rPA anthrax vaccine
    - $362.7 million for 15 million doses of AVA anthrax vaccine
    - $17.5 million for 4.8 million units of Pediatric KI syrup
    - $21.9 million for 390,000 doses of Ca-DTPA, and 60,000 doses of Zn-DTPA
    - $362.6 million for 200,000 doses of botulinum antitoxin
    - $308.4 million for 30,000 courses of anthrax therapeutics
    - $165 million for 20,000 treatment courses of anthrax monoclonal antibody
    - $144 million for 10,000 treatment courses of anthrax immune globulin

- Furthermore, additional requests for product have been issued to solicit competition for BioShield contracts to fulfill the need for:
    - Up to 20 million doses of next generation (MVA) small pox vaccine

- Up to 100,000 treatment courses of drugs to counter the effects of neutropenia associated with acute radiation syndrome (ARS).

The threat from biological weapons is dynamic and evolving. Recent advances in the life sciences have made it easier than ever before to enhance traditional biological threat agents to avoid our current countermeasures, or to engineer completely novel threat agents that we would be unable to detect or treat.

We must continue to support ongoing efforts to develop improved and more effective countermeasures against the traditional threat agents (anthrax, plague, smallpox, etc.) that present an immediate threat to our National Security, and present the best opportunity for medical mitigation. Simultaneously however, the Nation must begin to invest in technologies that will allow for a rapid and flexible defense against enhanced or engineered biological agents. The development of new host based diagnostic techniques including: Molecular biomarkers -- such as messenger ribonucleic acid (mRNA) and proteins -- could provide new tools to determine an individual's exposure to a number of potential pathogens. Additionally recent breakthroughs in the life sciences can be exploited to develop new therapeutics and broad spectrum countermeasures. For example, emerging technologies like RNA interference -- coupled with vectors for delivering DNA vaccines and advances in DNA synthesis technology could form the basis for a highly robust system for therapeutics against a wide range of viral infections. While a great deal of basic and applied research will be required to make these possible new detection mechanisms and treatments a reality, such systems could drastically reduce the time needed to respond to future threats.

Protection of Food and Agriculture

Our agricultural system is vital to the well being of the United States and accounts for approximately 12 percent of our Gross Domestic Product. It ensures that we can feed our Nation without depending on other countries – a significant strategic advantage over many countries in the world. Recognizing this importance the President has designated the Nation's agriculture and food systems as a critical infrastructure and on January 30th, 2004, signed Homeland Security Presidential Directive 9 (HSPD-9) which established a national policy to defend the agriculture and food system against terrorist attacks, major disasters, and other emergencies.

In response to HSPD-9, which calls for an acceleration and expansion of the development of current and new countermeasures against the intentional introduction or natural occurrence of catastrophic animal, plant, and zoonotic diseases, the Subcommittee on Foreign Animal Disease Threats (FADT) of the President's National and Science Technology Council, has brought together leading agro-defense experts and decision makers from many federal agencies to identify the key technological tools needed to protect our agricultural system and the supporting research to develop them. The Subcommittee has focused on those agricultural threats with the greatest potential economic or public health impacts and limited its scope to the research and development

(R&D) needed to inform policy decisions and/or provide the key tools to mitigate the impacts of a natural or intentional agricultural outbreak.

Also in response to HSPD-9, the Department of Homeland Security established the National Center for Food Protection and Defense in Minnesota and the National Center for Foreign and Zoonotic Disease Defense in Texas. Each of these centers is conducting research to further protect and defend our nation's food and agricultural system.

Detection of Nuclear Materials

The prevention of the terrorist use of nuclear weapons against the United States remains one of the highest priorities of this administration. Central to our ability to defend against nuclear terrorism is our ability to detect and interdict illicit special nuclear material as early and as far away from U.S. territory as possible. The ability to interdict nuclear and radiological material (to search, locate, identify and/or track) is dependent on the technological capability to detect material with the appropriate sensitivity and selectivity, at a distance without false alarms, and to carryout this work in operational settings that requires self sufficient, efficient, mobile, hardened and integrated systems. The technical gaps to achieve such a complete capability require evolutionary as well as transformational advancements. It requires exploitation of existing technologies and development of new detectors to improve detector arrays, reduce false or nuisance alarms, operate at lower power, have faster electronics, be environmentally stable, have higher efficiency, be available at different sizes/shapes depending on the operational setting, have improved selectively and sensitivity and greater network capability, and work at greater standoff distances. Closing these gaps will require improved active and passive interrogation methods, improved radiography, and innovative techniques to improve quality of images, detection at high speeds, and the development of an open architecture with sensor networks to support data fusion and integration. As with nonproliferation, no single detection system alone can do the job and development of capability to address the interdiction mission in concert with the nonproliferation efforts will radically improve our domestic security.

As mentioned earlier a central figure in ensuring that this research is accomplished is the newly formed Domestic Nuclear Defense Office within DHS. The President's FY 2007 budget request supports aggressive R&D and operational programs for nuclear defense, including a requested $535 million in FY 2007 (a 70 percent increase over FY 2006 funding) for DNDO, which includes funds that will support the kind of transformational research that will be necessary to develop the next generation of detection systems. However, we also urge the Senate and the House to restore full funding to DNDO as it enters into conference negotiations on the DHS appropriations bill.

While the development of advanced nuclear materials detection technologies has been called out as a priority in the 2008 budget memo, it is important to note that there are additional technical challenges associated with a robust and comprehensive defense against a terrorist use of a nuclear weapon which mandate investment in research and development that runs the gamut from basic science and technology to prototype

deployment. Beyond detection, the spectrum of R&D is equally broad, covering research with the objective of decreasing the legitimate demand for highly enriched uranium or plutonium; detecting nuclear development and testing programs overseas; securing existing stockpiles of weapons and material; attribution; render safe; and consequence management. R&D programs across the federal government are supporting these various elements of domestic nuclear defense. These programs are structured to meet each federal department's highest priority objectives engendering unique requirements that ultimately drive mission-specific advanced technology development. The R&D efforts underlying many of these mission areas have common or synergistic elements. These synergies necessitate consideration of how best to coordinate efforts, identify and fill technical gaps, and promote technical advancement ensuring the generation-after-next defensive capability. OSTP has been leading an interagency effort under the HSC/NSC Domestic Nuclear Defense Policy Coordinating Council to ensure that all nuclear defense R&D is adequately coordinated and appropriately funded to meet each federal department's highest priority objectives.

Conclusion

Defending our nation against attacks with weapons of mass destruction, especially nuclear and biological weapons has been and will be continue to be a top priority of this administration. We have worked diligently over the past four years to develop strategies to address these threats. Our strategies for the defense against biological and nuclear weapons are based upon sound scientific input, and provide a coordinated plan that takes full advantage of the diverse and varied scientific capabilities and expertise of the entire federal government to ensure that we have the necessary tools to prevent, detect, protect against, or respond to attacks with WMD. While science and technology have contributed a great deal to our defenses against nuclear and biological agents there is still much work to be done. With the continued support of Congress for this essential research we will continue to make significant improvements in our capabilities to defend ourselves against the threats of biological and nuclear weapons.

Mr. Chairman, and members of the Subcommittee, I thank you for the opportunity to testify to today. I look forward to answering any questions you may have.